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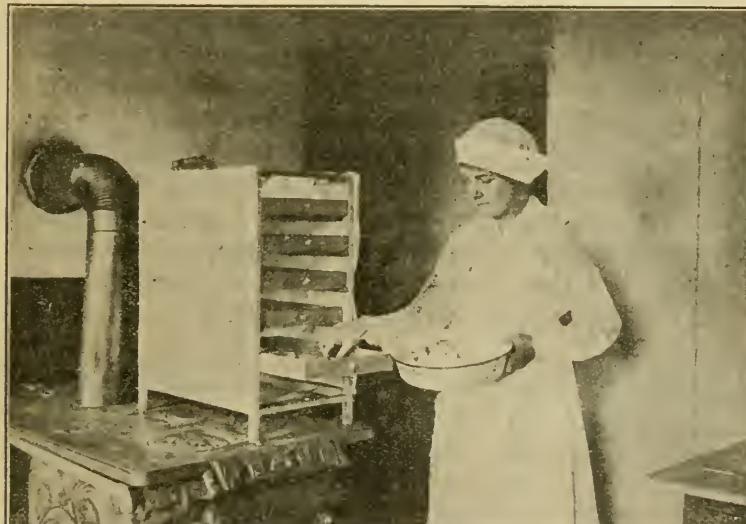
## Cooperative Extension Work in Agriculture and Home Economics

United States Department of Agriculture and State  
Agricultural Colleges Cooperating

# DRYING VEGETABLES AND FRUITS FOR HOME USE

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**H**OME DRYING, with the exception of some drying of fruit, had almost become a lost art in American homes previous to the war. The war's demands for increased saving of food and difficulty in obtaining sufficient containers in which to can the large surplus production brought home drying into prominence again.

On account of the demands from the county home demonstration agents, the Office of Extension Work South, in April, 1917, furnished instructions in improved methods in home drying of fruits and vegetables, with the result that in 1917 there were dried and stored for home use in the 15 Southern States 5,511,881 pounds of fruit and vegetables.

The improved methods brought home drying into such favor in the South that in 1918 the amount of dried fruit and vegetables stored for home use in the Southern States amounted to almost 6,500,000 pounds.

The methods which have been successfully used in this work by home-demonstration agents in the South are described in this circular.

## DRYING VEGETABLES AND FRUITS FOR HOME USE.

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Many vegetables and fruits, which would otherwise go to waste, can very easily be conserved for home use by a simple process of drying which can be carried out in the average home. Dried products require no outlay for expensive containers and under proper conditions can be stored almost indefinitely in relatively small space. One hundred pounds of fresh, green vegetables will average about 10 pounds of the dried products. Vegetables and fruits, if properly dried, retain their natural flavor and food value, and, when properly cooked, can be made into most attractive and wholesome dishes.

### DRIERS OR EVAPORATORS.

Vegetables and fruits can be dried in an oven or in trays or racks over the kitchen stove, or in a specially constructed drier. There are small driers on the market which give satisfactory results. The small cookstove driers or evaporators are ovenlike structures, usually made of galvanized sheet iron, or of wood and galvanized iron. They are constructed so they can be placed on the top of an ordinary wood or coal range, or over a kerosene stove. These driers hold a series of small trays on which fruits or vegetables are placed after being prepared for drying. Portable outdoor evaporators are especially convenient when it is desired to dry as much as 10 bushels of fruit or vegetables a day. They are usually constructed of wood, except the parts in direct contact with the heater. The homemade dry kiln used in some sections of the country can be cheaply and easily made of brick and stone.

### HOMEMADE COOKSTOVE DRIER.

A drier that can be used on a wood or coal range or a kerosene stove can be readily made. (Fig. 1.) The following dimensions will give a drier for use over a very large range or over a small

furnace built for the purpose of supplying heat. For smaller stoves or for use over oil stoves, change dimensions to correspond to surface of stove. Where large community driers are needed, this drier can be enlarged to suit conditions, or it may be made in sections each of the same size as given in the following instructions: Base 24 by 16 inches; height, 36 inches. A base 6 inches high is made of galvanized sheet iron. This base slightly flares toward the bottom and has two small openings for ventilation in each of the four sides. On the base rests a boxlike frame of 1 or  $1\frac{1}{2}$  inch strips of wood  $\frac{1}{2}$  inch wide. The two sides are braced with  $1\frac{1}{4}$  inch strips  $\frac{1}{2}$  inch wide which serve as cleats on which the trays in the drier rest. These are placed at intervals of 3 inches, and are cut to fit the uprights

so they are flush with the outside. There should be no open space between side covering and cleats whereby heat can escape instead of passing over and through the products to be dried. The frame is covered with tin or galvanized sheet iron which is tacked to the wooden strips of the frame. Thin strips of wood or plaster boards may be used instead of tin or sheet iron. The door is fitted on small hinges and fastened with a thumb latch, and opens the full width of the drier so that the trays can be easily removed. The bottom in the

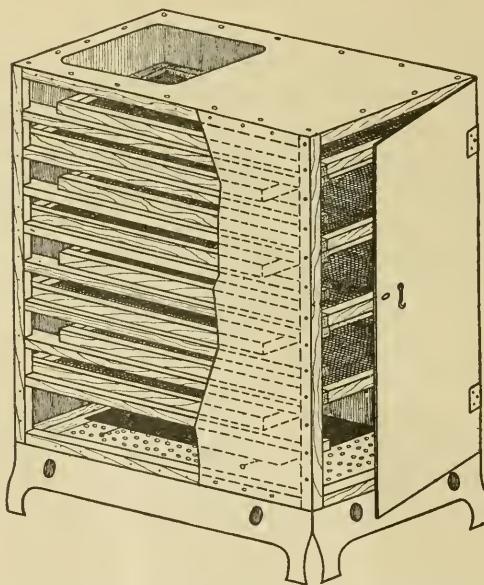


FIG. 1.—A metal-covered cabinet type of homemade drier.

drier is made of a piece of perforated galvanized sheet iron. Two inches above the bottom is placed a solid sheet of galvanized iron three inches less in length and width than the bottom. This sheet rests on two wires fastened through the sides of the drier. This prevents the direct heat from coming in contact with the product and serves as a radiator to spread the heat more evenly.

The first tray is placed 3 inches above the radiator. The trays rest on the cleats 3 inches apart. A drier of the given dimensions will hold eight trays. The frame of the tray is made of 1-inch strips on which is tacked galvanized screen wire, which forms the bottom of the tray. The tray is 21 by 15 inches, making it 3 inches less in depth than the drier. The lowest tray when placed in the drier is pushed

to the back, leaving the 3-inch space in front. The next tray is placed even with the front, leaving a 3-inch space in the back. A small nail or a little wooden knob may be fastened on the cleats to act as a stop for the trays. The other trays alternate in the same way. This permits the hot current of heated air to pass around and over the trays as well as through the products to be dried. A ventilator opening is left in the top of the drier through which the moist air may pass away. This should, for this size drier, be 10 by 12 inches.

The principle of construction is such that currents of heated air pass over the product as well as up through it, gathering and carrying along the moisture with it. The movement of the current of air induces a more rapid and uniform drying. The upper trays can be shifted to the lower part of the drier and the lower trays to the upper part as drying proceeds, so as to dry the products uniformly. The thermometer is placed on the lower tray.

If drying is done in a cookstove oven, leave the oven door ajar. Note the temperature of oven often.

Trays for use in the oven can be made by using a convenient-sized piece of galvanized wire screen with the edges bent up 1 or 2 inches.

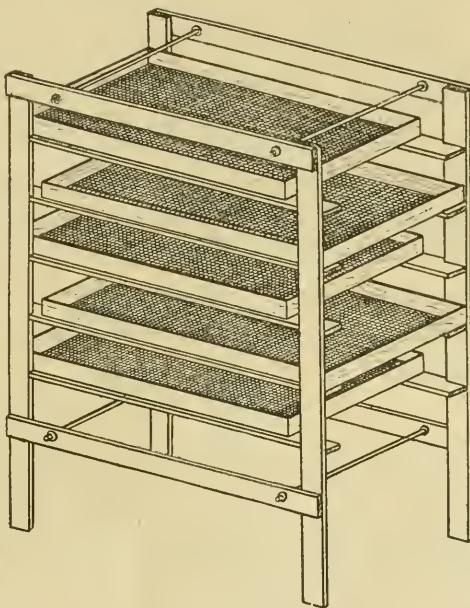


FIG. 2.—An inexpensive homemade cookstove drier.

#### A CHEAPER HOMEMADE DRIER.

A very satisfactory drier can be made of lath (preferably cypress, poplar, or other nonresinous wood), wire screens, and cotton canvas or heavy unbleached muslin. (Fig. 2.) It can be used over a wood stove, furnace, oil or gas stove and can be made in size to suit the particular source of heat used. It can be made to take apart and pack flat, for agents' use in demonstrations, or it can be made rigid for home use.

A five-tray drier with bottom 24 by 11½ inches can be made from the following material:

Uprights, 4 pieces of lath 1½ by  $\frac{3}{8}$  inch, 23 inches long.

Cleats or shelves, 10 pieces of lath 1½ by  $\frac{3}{8}$  inch, 24 inches long.

Side braces, 4 pieces of lath 1½ by  $\frac{3}{8}$  inch, 24 inches long.

Side pieces for trays, 10 pieces of lath  $1\frac{1}{4}$  by  $\frac{3}{8}$  inch, 21 inches long.

End pieces for trays, 10 pieces of lath  $1\frac{1}{4}$  by  $\frac{3}{8}$  inch, 10 inches long.

Galvanized wire screen or netting, 5 pieces  $21\frac{1}{2}$  by  $11\frac{1}{4}$  inches (10 meshes to 1 inch of  $\frac{1}{8}$  inch mesh).

Canvas or muslin, 7 feet long and 24 inches wide.

Brads,  $1\frac{1}{2}$  and 1 inch lengths.

Double-pointed tacks.

Sheet iron (preferably galvanized), 1 piece 18 by 7 inches.

In case the drier is made rigid it will require in addition:

End braces, 4 pieces of lath  $1\frac{1}{4}$  by  $\frac{3}{8}$  inch,  $12\frac{1}{2}$  inches long.

$\frac{1}{8}$ -inch galvanized wire, 2 pieces 12 inches long.

In case the drier is made to fold it will require:

Iron rods, 4 pieces  $13\frac{1}{2}$  inches long,  $\frac{1}{4}$  inch diameter, with  $2\frac{1}{2}$ -inch thread cut from each end and each end supplied with 2 nuts.

The uprights are marked off from the one end as follows: 5, 3, 3, 3, 3, 3, 3 inches. The ends of the cleats or shelves are cut to fit the uprights as shown in figure 3.

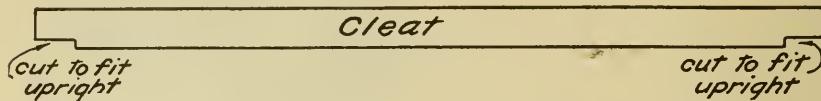


FIG. 3.—The ends of the cleats or shelves are cut to fit the uprights.

They are nailed on as shown in figure 4.

The braces are then put on at the upper outside edge and 5 inches from the bottom. Through these, if the drier is to be folded, drill four holes  $\frac{3}{16}$  inch diameter, if the iron rods are  $\frac{1}{4}$  inch. In the upper brace drill the holes 3 inches from each end. In the lower brace drill them 6 inches from each end. Through these holes put the iron rod so one of the nuts is on the inside and the other on the outside as shown in figure 5.

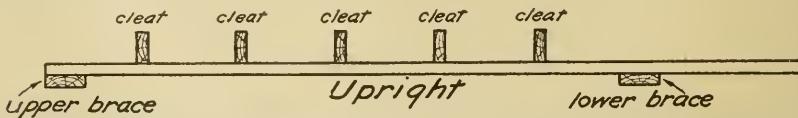


FIG. 4.—The cleats nailed to the upright, showing the upper and lower ends braced.

These rods hold the sides rigidly together, but as they can be quickly removed the drier can be packed flat. On the two lower iron rods place a piece of sheet iron about 18 by 7 inches. This will act as a radiator and at the same time serve as a protection against the direct heat of the flame when the drier is put over an oil or gas stove. When used over an ordinary stove the piece of sheet iron may be removed.

In case the drier is to be made without the iron rods, the end braces are nailed in place, two at each end, fitting with the braces on the

sides. In that case holes are drilled, as when the drier is to be taken apart, 6 inches from each end in the two lower side braces. A piece of heavy wire is put through each pair of holes and on these the sheet iron is placed when used over a flame.

Around the bottom of each of the four uprights place a piece of sheet tin to prevent scorching the wood when the drier is placed on top of an ordinary stove or over a furnace. An eightpenny nail driven halfway into the lower end of each of the uprights can take the place of the tin as support for the drier.

The canvas is next put on so it is about 2 inches from the lower end of the uprights. Tack the one end of the canvas to the front side of one of the uprights and tack along the sides. It is important to tack it once or twice on each of the shelf cleats in order to keep the canvas close to the sides so as to prevent the loss of heat which will take place if a space is left between the canvas and the cleats. The extra width of canvas is allowed to overlap top. The canvas is fastened on both sides, and holes are cut for the iron rods to pass

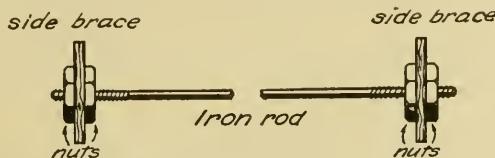


FIG. 5.—The iron rod serves as a brace to hold the sides rigid, but may be removed so that the drier can be packed flat.

through if the drier is made to fold. The extra length of canvas is put around the front end and fastened with a pin or with small clasps.

The extra width of canvas extending over the top part of drier can be folded, stretched tightly in the corners, and fastened with pins, clasps, or buttons so as to hold the canvas tight and prevent it from dropping down on the upper tray, and still leaving an opening in the center for the passage of the heated-air current. If preferred, and for the type of drier that is not to be taken down, a single piece of canvas can be nailed over the top and a square hole cut in the center about 17 by 8 inches. This opening may be covered with coarse mosquito netting to keep out insects.

The trays are nailed together so that they are 10 inches wide, inside measure. All edges of the pieces of the wire screen are bent over one-fourth inch and hammered flat, so the edges will not be rough. The screen is then tacked to the bottom of the trays. The trays are placed on the shelves or cleats in such a way that they are alternately pushed to the back of the drier or left at the front.

**DRYING VEGETABLES.****SELECTION AND PREPARATION.**

Equally as great care should be given to the selection and preparation of vegetables for drying as for canning. To secure a fine quality of dried products much depends upon having the vegetables absolutely fresh, young, tender, and perfectly clean. Wash and clean all vegetables well. If steel knives are used in paring and cutting, have them clean and bright so the vegetable will not be discolored.

Keeping green plants by drying is a very old process. It has been customary for ages to dry grass for cattle feed and store it under the name of hay. It has also long been customary to dry garden herbs and medicinal plants for home use. However, green vegetables dried in the sun and air as hay is dried become tough and of a brownish color. This is partly due to the so-called "hay bacteria." If the green color and the crisp condition are to be preserved, the drying must be quicker, by artificial heat, and the vegetables should be given a preliminary treatment to prevent or retard the action of the hay bacteria. This preliminary treatment is called blanching, and consists in subjecting the vegetables to a short cooking in live steam or in boiling water. The steaming is preferable.

Blanching is done after the vegetables are prepared properly. Besides retarding or preventing the action of the hay bacteria, it gives the vegetables a more thorough cleaning, removes the strong odor and flavor from certain kinds of vegetables and softens and loosens the fiber. This allows the moisture in the vegetables to evaporate more quickly and uniformly. It also quickly coagulates the albuminous matter in the vegetables, which helps to hold in the natural flavors. Use a wire basket or cheesecloth bag for blanching in boiling water or use a steam cooker for blanching in live steam. The steaming can also be done in a common wash boiler with 2 to 4 inches of boiling water in the bottom. Use a wire basket to fit inside the wash boiler or a piece of cheesecloth tied to the handles of the boiler and suspended down into the boiler so it does not touch the water. Lay the vegetables to be blanched on this cloth and cover with a close-fitting lid so as to let the steam from the boiling water act on the vegetables for the time given in the recipe.

Where it is desirable to preserve the green color of the vegetables, as with string beans, spinach, etc., it is advisable to blanch in boiling water to which has been added  $1\frac{1}{4}$  level teaspoons of salt and 1 level teaspoon of bicarbonate of soda (baking soda) for each gallon of water. In case salt and soda are used in the blanching water, the green vegetables, after blanching, are quickly dipped in cold water. Drain well (the surface moisture can be further removed by press-

ing the vegetables lightly between two towels) and place at once in drying frames. Vegetables so blanched will give a dried product which remains green and crisp. Where no soda and salt are used in blanching water, it is not necessary to dip the products, after blanching, into cold water.

The vegetables are spread in a thin layer on the trays or drying frames of the drier. The temperature for drying should be rather low to prevent scorching the product.

#### METHODS OF DRYING.

Drying of vegetables can be done in two ways, either by starting at a high temperature which is gradually lowered, or by starting at a low temperature which is slowly increased. The first method is often advisable where blanching has been done in water in order quickly to remove surface moisture, but care must be taken to reduce the temperature as soon as this moisture is removed, to prevent the surface from becoming hard and dry and thereby causing difficulty in properly drying the product through and through. This method is also often of advantage when drying in the oven of the ordinary cookstove in use on the farm. Put the trays in the oven and leave the oven door partly open in order that the moist air may escape. When partly dried the trays can be put in a rack over the top of the stove and finished by utilizing the waste heat from the stove.

When drying is started at a low temperature and the heat is increased gradually, great care must be exercised when products are nearly dry not to let them scorch, which, of course, would ruin their quality. The temperatures that give best results are given with each recipe. The time required for drying varies according to the products and their moisture contents, but most vegetables can be dried in from 2 to 5 hours. The material should never be placed in too thick layers on the drying trays, and should be stirred or turned frequently during drying in order to secure a uniform product. For vegetables, drying should be continued until the products are so dry that they snap or break on bending.

It is important to know the temperature in the drier, and this can not be determined accurately except by using a thermometer. Inexpensive oven thermometers can be found on the market, or an ordinary chemical thermometer can be suspended in the drier. If a thermometer is not used the greatest care should be given to the regulation of the heat. The temperature in the drier rises quickly and the product may scorch unless close attention is given.

**Artichokes.**—The fleshy edible part of the bur artichoke can be dried successfully. Blanch 4 to 6 minutes in boiling water to which a little vinegar has been added (1 tablespoon vinegar to 1 quart water).

Start drying at 110° F. Raise temperature slowly to 145° F. and finish drying at that temperature.

**Asparagus.**—Young, tender asparagus tips should be washed, blanched for 3 minutes in water with salt and soda added ( $1\frac{1}{4}$  teaspoons salt and 1 teaspoon soda to 1 gallon water) and dipped quickly in cold water. Dry off surface moisture and spread in thin layers on drying frames. Dry at 120° to 140° F. The asparagus will to some extent darken but will partly recover color when soaked for use.

It very often happens, in canning asparagus, that little ends are cut off. These should not be thrown away but washed, blanched, and dried. They will be good to boil in soups, where the asparagus flavor is wanted.

**Green string beans.**—All varieties of string beans can be dried. Wash and string the beans carefully. The very young and tender string beans can be dried whole. Those that are full grown should be cut in  $\frac{1}{4}$  to 1 inch lengths with a vegetable slicer or a sharp knife. It is better to cut beans than to snap them, as pieces then are of uniform size and can dry more evenly. Put in a bag of cheesecloth, or in a wire basket, and blanch in steam or boiling water for 3 to 10 minutes, depending on the maturity of the beans. If desired to keep the green color, blanch in boiling water with salt and soda added ( $1\frac{1}{4}$  teaspoons of salt and 1 teaspoon of baking soda for each gallon of water). Then dip quickly in cold water. Drain, remove surface moisture according to directions given above, spread in thin layers on trays of drier, and dry until brittle. Start drying at 110° F. and raise temperature gradually to 145° F. Drying may also be started at 175° F. and the temperature reduced, when the surface moisture is removed, to 140° F., at which temperature they are finished.

If the beans are full grown but the pods have not turned yellow or are just beginning to turn yellow, the beans should be shelled, blanched 6 to 8 minutes, and dried at the same temperature as given above. Be careful to dry slowly enough to dry the beans all the way throughout.

**Wax beans** are dried in the same manner as the string beans.

**Lima beans** are shelled and dried. If gathered before maturity when young and tender, wash, shell, and blanch from 5 to 10 minutes, the length of time depending on the maturity of the beans. Remove surface moisture and dry at the same temperature as for string beans.

**Cowpeas and black-eyed peas** when very young and tender may be washed, cut in 1-inch pieces, blanched in water with salt and soda added, dipped in cold water, and dried like green string beans. When full grown they may be shelled, blanched 6 to 8 minutes, and dried like lima beans.

**Dry shelled beans.**—Different kinds of beans, after maturing and drying on the vines, can be treated as follows: Shell, wash, and spread in thin layers on the trays of the drier. Heat 10 minutes, beginning at 160° F. and gradually raising the temperature to 180° F. This high temperature will destroy all insect eggs that might be on the beans. Cowpeas or any field pea can be treated in the same way. Cool and store carefully. The heating of the bean or pea destroys its vitality, and legumes thus treated can not be used for seed.

**Beets.**—Leave about 1½ inches of stem on beets and leave roots. Wash, boil until a little more than three-fourths done. Drain at once, allow to cool slightly, peel, and cut in  $\frac{1}{8}$  to  $\frac{1}{4}$  inch slices. Dry at 120° or start at 165° F. and reduce to 145° F.

**Beet greens.**—The beet leaves can be dried as greens. Remove the stems and heavy ribs, wash, shred, and blanch in steam 3 to 5 minutes or in boiling water with salt and soda added for 3 to 4 minutes. Remove surface moisture, spread on drying trays, and dry at 110° to 140° F., or start at 155° F. and reduce to 140° F.

The stems of the beet leaves, if tender, may also be dried. Cut in 1-inch lengths and blanch 4 to 6 minutes. Remove surface moisture and dry from 120° to 140° F.

**Brussels sprouts.**—The small firm heads are dried whole. Discard any spoiled outer leaves. Wash and blanch from 3 to 5 minutes in boiling water with salt and soda added. Dip quickly in cold water. Drain, remove surface moisture, and spread on drying frames. Start at 120° F. and increase slowly to 135° or 140° F., or start at 175° F. and reduce heat to 140° F.

**Cabbage.**—Shred or cut into strips a few inches long. The core and coarse ribs should be removed, as they dry more slowly than the thinner parts of the leaves, but they may be dried separately. Blanch in steam for 6 to 12 minutes or in boiling water 5 to 10 minutes. Add salt and soda to the blanching water and plunge into cold water if cabbage is green and it is desired to keep the green color. Dry at from 110° to 140° F., or start at 175° F. to remove surface moisture and reduce heat to 140° F.

**Collards and kale** should be washed well, the coarse stems and ribs removed, sliced or shredded, blanched in boiling water with salt and soda added, dipped in cold water, surface moisture removed, and spread on drying trays. Dry at same temperature as for cabbage.

**Red cabbage.**—Cut or shred as cabbage. Blanch 5 to 10 minutes in half water and half vinegar. Remove surface moisture and dry at the same temperature as for cabbage.

**Cauliflower.**—Clean, divide in small bunches, and blanch in steam 4 to 6 minutes or in boiling water 3 to 6 minutes. Cauliflower may also be blanched in half milk and half water to which salt and soda have been added. In that case dip in cold water, drain well, and dry at from 110° to 140° F., or start at 175° F. and reduce to 140° F.

It turns rather dark in drying, but will regain part of the natural color in soaking and cooking. When soaking, pour boiling water over cauliflower and soak in that. Dried cauliflower is especially good in soups and omelets.

**Carrots, parsnips, salsify, and root parsley.**—Clean, scrape or pare, cut in  $\frac{1}{8}$ -inch slices and blanch in steam from 4 to 8 minutes or in boiling water 5 to 6 minutes. (Carrots may be blanched in water with salt and soda added and dipped into cold water.) Remove surface moisture and dry at from 110° to 140° F., or start drying at 185° F. and reduce temperature to 140° F.

**Kohl-rabi, turnips, and rutabagas** are washed, pared, sliced, and blanched, and then dried like carrots and parsnips.

**Celery.**—Only young and tender celery should be used for drying. Clean, cut in  $\frac{1}{2}$  to 1 inch lengths, and blanch 3 to 4 minutes in steam or 2 to 3 minutes in boiling water. Drain, remove surface moisture, and dry at 120° to 140° F., or start drying at 155° F., and reduce temperature to 135° F.

The tender leaves of celery may be dried for soup. Clean, blanch 1 to 2 minutes in steam or leave unblanched, and dry as celery.

**Celeriac or turnip-rooted celery** is cleaned, pared, or scraped, sliced, blanched, and dried like kohl-rabi when it is to be used for soups or stews or for mashed celeriac.

Celeriac also makes an excellent flavoring for meats, soups, gravies, etc., and almost takes the place of pepper. For that purpose the roots must not be left in water, as they then quickly lose value as a spice. Brush roots clean with a vegetable brush and rinse quickly in water. Pare and cut into very thin slices. Do not blanch; dry at a uniform temperature of 135° F. When nearly dry, cut with scissors or knife in small pieces about  $\frac{1}{8}$  inch square. Return to drier and finish at 140° to 145° F. Powder and keep in well-corked bottles.

**Sweet corn.**—Select very young and tender corn in the milk stage. Prepare at once after gathering by removing husk and silk. Sort ears so those of same maturity are blanched together. Trim off any worm-eaten parts. Blanch on the cob in steam or boiling water from 5 to 10 minutes or until milk is set. A teaspoon of salt per gallon of water may be added to the blanching water. Drain well and cut from cob with a very sharp knife. Cut first tip of grain, then slice grains about half way down to the cob and scrape out the remainder of grain with back of knife. In that way chaff is left on cob. Dry at from 120° to 140° F., or start drier at 165° F. and reduce temperature to 140° F.

When field corn is used, select the ears as for good plump roasting ears. Blanch 8 to 10 minutes. Drain, slice kernels and dry as sweet corn.

Corn may be dried in the sun. Dry in oven 10 or 15 minutes at 165° F. and finish drying in the sun. Protect from insects and dust. Sun drying is, of course, not satisfactory in moist weather and the dried product will be darker and not as attractive in appearance. When dried in the sun it should be heated in the oven, before storing, for 10 minutes at 165° to 175° F. in order to kill insect eggs.

**Horse-radish.**—Wash, scrape, slice in  $\frac{1}{8}$ -inch or thinner slices and rinse in vinegar. Do not blanch. Dry slowly, starting at 125° F. and finishing at 135° to 140° F. Dry hard, but do not scorch. Grind or powder. Keep in well-corked bottles or in tin cans. Before using the powder, dampen with water and leave covered for about 2 hours.

**Leek.**—Wash carefully after cutting off the roots and spoiled leaves. They can be dried whole, if not too large, or cut in  $\frac{1}{4}$ -inch slices. Blanch in steam 5 minutes or 2 to 4 minutes in boiling water. Drain, remove surface moisture and start drying at 110° to 120° F. Increase temperature slowly to 140° F. or start at 175° F. and reduce temperature to 135° F.

**Mushrooms.**—Do not attempt to collect mushrooms unless you *know* the edible varieties.

All edible fungi can be dried. Wash carefully with a woolen cloth and lukewarm salt water. After cleaning, place in clean, cold salt (1 tablespoon salt to 1 gallon water). The lamellae are not removed from the small partly closed mushrooms, but they are removed from the large open ones from which also the outer skin is removed. Remove from the salt water, put in a crock and pour over them boiling water with a little vinegar and salt added (1 tablespoon vinegar and  $\frac{1}{2}$  teaspoon salt per quart water). Let stand for  $\frac{1}{2}$  hour. Drain well. Place on a coarse towel, cover with another towel, and wring as when wringing clothes. Spread on a board or on trays covered with cheesecloth and dry in air, preferably in draft and sunshine, for a couple of days. Then place in an oven or in a drier for a few hours at from 100° to 120° F. until thoroughly dry.

Mushrooms should not be packed until several hours after they are dried. It will be necessary to keep them in a very dry place or they may mildew. It may be necessary to dry them again in case of damp weather. Before using them, soak in lukewarm water or milk. The dried mushrooms can also, when thoroughly dried, be powdered. This powder may be kept in well-corked bottles and be used for thickening of soups or gravies where the mushroom flavor is wanted.

A simpler way of preparing them is to clean them, scrape and wipe dry with a clean piece of linen. Cut in small pieces and dry at 110° to 130° F. until they can be powdered. This powder must be kept very dry or it will quickly spoil.

**Okra.**—Wash, blanch in steam 2 to 3 minutes, or in boiling water with salt and soda added and plunge into cold water. Drain and

dry at from 110° to 140° F. Okra can also be started at 155° F. and the temperature reduced to 135° F. Young and tender pods may be dried whole. Older pods should be cut in  $\frac{1}{4}$ -inch slices before drying. If dried in the sun or in front of stove, strung on strings, the okra must be heated to 165° F. in the oven before storing.

**Onions.**—Where onions do not keep well from one crop to another, they can be dried very successfully. Wash, peel, and slice in  $\frac{1}{8}$  to  $\frac{1}{4}$  inch slices. To avoid any unpleasantness, peel and slice, holding onions under water. Blanch in steam or boiling water 3 to 5 minutes. Remove surface moisture, dry at from 120° to 140° F., raising temperature gradually.

**Peas.**—In case of the very young and tender so-called English sugar peas, the pods may also be used. Wash and cut in  $\frac{1}{4}$ -inch pieces and blanch 3 to 4 minutes in boiling water with salt and soda added. Dip in cold water, drain, and dry at from 110° to 140° F. They may also be started drying at 165° F. and the temperature reduced to 140° F. Garden peas are shelled, sorted according to size, and blanched in steam or boiling water from 1 to 6 minutes. Salt and soda may be added to blanching water, but are not necessary as peas generally keep color quite well. Remove surface moisture and dry small peas at 110° to 135° or 140° F. They may also be started at 155° F. and temperature reduced to 135° F. Larger peas are dried at 110° F. to 140° or 145° F. You may start them at 165° F. and reduce temperature to 140° F. It is very important to dry peas so slowly that they dry all the way through, else they may easily mildew and spoil.

Shelled peas may also be stirred for a moment over the fire in a kettle or pan with 1 teaspoon salt and a tablespoon sugar for each quart shelled peas. Stir until peas are bright and have a clear green color. Place at once on drying frames and dry at the temperature given above.

The fresh pods of the peas, when washed, may also be dried and used in boiling stock for vegetable soup. They may also, while fresh, be boiled, passed through a sieve, and be stewed as spinach and served with finely diced carrots.

**Peppers.**—Peppers may be dried by splitting on one side, removing the seed, drying in the air and finished in the drier at 140° F. A more satisfactory method is to place peppers in pans in a very hot oven and heat until the skin blisters or steam the peppers until the skin softens. Peel, split in half, take out seed and dry at 110° to 140° F. In drying thick, fleshy peppers like the pimento, do not increase heat too quickly but dry slowly and evenly. Small varieties of red peppers may be spread in the sun until wilted and the drying finished in the drier, or they may be entirely dried in the

sun. If seeds are to be saved, they should be removed before heat is applied.

**Pumpkin and squash.**—Pare and remove seed when the seed are large. For the young, tender, summer squash the seed may be left in. Cut in  $\frac{1}{4}$  to  $\frac{1}{2}$  inch slices and blanch in steam or boiling water 3 to 5 minutes. Drain, remove surface moisture, and dry slowly at from  $125^{\circ}$  to  $150^{\circ}$  F. or start drying at  $165^{\circ}$  F., reducing temperature to  $140^{\circ}$  F.

**Eggplant** may be dried like squash.

**Potatoes.**—Clean, pare, drop in cold water after paring. Remove and slice in  $\frac{1}{8}$  to  $\frac{1}{4}$  inch slices. Blanch by steam 3 to 5 minutes or in boiling water 2 to 4 minutes. Drain well, remove surface moisture, and dry at  $120^{\circ}$  to  $145^{\circ}$  F. They may also be started at  $185^{\circ}$  F. and temperature reduced to  $140^{\circ}$  F.

Potatoes can also be steamed or boiled in water until entirely cooked, peeled, mashed with a potato masher, and pressed through a potato ricer. Then spread thinly on the drying frames covered with cheesecloth and dry at from  $115^{\circ}$  to  $140^{\circ}$  F.

**Sweet potatoes.**—Wash, pare, and slice in  $\frac{1}{8}$  to  $\frac{1}{4}$  inch slices. Blanch in steam or boiling water 6 to 10 minutes. Drain, and remove surface moisture. Dry at  $130^{\circ}$  to  $155^{\circ}$  F. They may also be started at  $185^{\circ}$  F. and temperature reduced to  $145^{\circ}$  F. Dry until brittle.

**Spinach.**—Wash, remove the coarse stems, and slice or leave leaves whole. Blanch 2 to 3 minutes in steam or 1 to 2 minutes in boiling water with salt and soda added. Dip in cold water, drain, and remove surface moisture. Spread thinly on drying frames and dry at  $110^{\circ}$  to  $140^{\circ}$  F. or start drying at  $160^{\circ}$  and reduce temperature to  $140^{\circ}$  F.

**Mustard greens, dandelions, chard and other greens** may be dried like spinach but should be blanched a little longer (from 3 to 5 minutes).

**Soup mixtures.**—Each vegetable used in the soup mixture is prepared and dried separately. After drying they are put together in the desired proportion. A combination of several vegetables makes a most desirable soup mixture. Those most often used are carrots, cabbage, onions, celery, and okra. Dried parsley and thyme may be added.

When the soup mixture is to be used, rinse in cold water and soak in lukewarm water and boil in water or in soup stock.

**Tomatoes** for drying must be ripe but not soft. Wash, blanch 1 to 2 minutes, dip in cold water, and remove skin and core. With a sharp knife cut in  $\frac{1}{4}$  to  $\frac{1}{2}$  inch slices. Cover trays with cheesecloth, put tomato slices in single layers and dry at  $110^{\circ}$  F. to  $140^{\circ}$  F.

Small tomatoes like the yellow fig tomatoes may be dried whole.

Tomatoes may also be boiled, passed through a sieve and the mass cooked down until it forms a paste. Then spread thinly on drying frames covered with cheesecloth and dry at the same temperature as for sliced tomatoes. The paste may also be spread on tin plates and dried. (For making tomato paste see Farmers' Bulletin No. 853.) It is better to make tomato paste and dry it than to dry whole tomatoes.

**Rhubarb.**—Wash the stems, skin, or leave skins on. Cut in slices  $\frac{1}{2}$  to  $\frac{3}{4}$  inch thick or cut in 2-inch pieces which are split in 4 to 8 parts according to thickness of stems. Spread immediately on drying trays covered with cheesecloth and dry in hot sun or in drier. Start drier at  $130^{\circ}$  F. and increase to about  $160^{\circ}$  F. or start at  $185^{\circ}$  F. and reduce heat to  $150^{\circ}$  F. Rhubarb will dry in a short time.

**Herbs, etc.**—All potherbs, parsley, mint, sage, etc., need not be blanched. Wash well and dry in the shade where there is a draught or in a drier. If in a drier start at  $115^{\circ}$  F. and finish drying at  $140^{\circ}$  F.

**Basil** is cut when the first flowers are commencing to open. It is used in spiced vinegar for pickles, in gravies, for potato salad, and for marinated meat and fish. When dried and powdered, basil is used as a spice for spiced herring or other fish, for sausage, liver paste, and similar things. Basil is one of the finest spices that can be used for pickling.

**Caraway.**—The very young green leaves of caraway can be finely chopped and added as spice to vegetable soups and to gravies. The ripe seed, when dried, is often used whole as spice for certain varieties of cheese, for pickled beets, and for certain cookies. Caraway seed can also be dried and powdered and used as spice for liver sausage, lung sausage, smoked sausage, cabbage soup, eel soup, etc.

**Coriander.**—The seed of coriander is a valuable spice, but it must be thoroughly ripe and stored for some time before using it, as when green it has an unpleasant taste. The ripe seed is dried and powdered. It is used as spice for cervelat sausage, smoked sausage, spiced meat, and spiced fish.

**Dill.**—When this plant is through blooming and is commencing to form seed, cut the umbels. Place them a few hours in the shade where there is a good draft, and they can be used for making spiced vinegar. When entirely dry, they can be used as spice. Dill is used for spiced vinegar, for pickles, for marinated fish, etc. When dried and powdered it can be used for spiced fish and for liver paste, liver sausage, etc.

**Sweet marjoram.**—The plants are cut when the flowers are not quite open. Tie in small bundles and dry in the shade. When nearly dry, finish drying in the drier and powder. The powder is used as spice for spiced fish and forced meat.

*Mint*.—The leaves of this plant are gathered when well developed and before the plant blooms. They are dried and can either be kept in this way or an extract can be made by pouring vinegar over them. Cork and let stand for 2 or 3 weeks, then strain and bottle. The mint vinegar can be used at the table as a spice and can be added to meat dishes and to different kinds of gravy where the mint flavor is desired.

*Sage*.—The leaves should be gathered when fully developed, dried in the shade, and finished in the drier. Sage may be kept whole or may be powdered. It is used for seasoning sausage, poultry stuffings, etc. The leaves can also be used for sage tea.

*Thyme*.—Gather and dry like sage. It is used for flavoring sausage, spiced meat, soups, and gravies.

*Tarragon*.—The stems are cut when the flower buds appear. The coarser parts of the stems are cut off and the fine stems and leaves are spread thinly in an airy place in the shade. When the stems are nearly dry, they can be used for spiced vinegar. They can be dried entirely, powdered, and used as spice in lung sausage, smoked sausage, potted meat, and similar products. In spiced vinegar the tarragon is used in pickles and for certain gravies.

*How to make spiced vinegar*.—A wide-mouthed bottle or a fruit jar is filled to within 2 inches of the top with spice plants of different kinds, such as slices of horse-radish and onions, seed umbels of dill, ripe seed of white mustard, and celery, green seed of nasturtiums, fine stems and leaves of tarragon, basil, and sweet marjoram. A pod of red pepper can also be added. The bottle or jar is then filled with vinegar, heated to 160° F., corked or sealed, and left for about 3 weeks. Strain the vinegar and fill into small bottles that are corked and sealed with melted paraffin or sealing wax.

This spiced vinegar is used in making pickles, for flavoring gravies, potato salad, and similar dishes. For pickling it is especially valuable, as the flavor by adding this spiced vinegar is the same all through the pickles, while if adding only whole pepper, cloves, and dill the flavor is more concentrated at the places where these spices are put. The herbs from which the spiced vinegar was made may be used as garnish by mixing them in the pickles.

*Dried plants used as tea*.—In earlier days it was common to prepare tea from home-gathered, often home-grown, plants. flowers, leaves, fruits, roots or barks. The imported tea has replaced most of these home-made teas. Many of them are still used extensively in Europe. Tea made from the flowers of linden or basswood is a common drink in France. Tea made from the flower stems of heath or ling is used in many places in central Europe. A very fragrant and pleasing tea is made from strawberry leaves.

*Strawberry tea.*—Collect the fresh young strawberry leaves (the leaves that come on the runners are excellent.) Spread them a few hours in a draft in the shade until wilted a little. Put leaves in a thin layer into a sieve or strainer and hold over boiling water where they are steamed a little but not so much that they fall together. Immediately after the steaming, put them on the drying trays and dry at uniform temperature ( $135^{\circ}$  F.) until entirely dry. Pack in tin boxes.

For use, the dried leaves are put in a cup and moistened with luke-warm water, covered and let stand for 10 minutes. Then pour into a warm teapot and pour boiling water over them. Let stand in a warm place for 10 minutes and the tea is ready to serve. One teaspoonful of the dried leaves will be about right for 3 cups of tea. This is a drink most people will like as it is mild and pleasantly flavored.

*Apple tea.*—The apples are cut into small pieces. Parings and cores left from the canning of apples can be used. Spread on drying frames and dry at strong heat so they become light brown but be careful not to burn or scorch the edges. (See under apples.) Keep in tin boxes.

When using the dried apples for tea, put them in a cup and moisten with lukewarm water, cover and let stand for 20 minutes on a warm stove. Pour them into a warm teapot and pour boiling water over them. Let stand 12 minutes and the tea is ready to serve. For 2 cups of tea, use a large teaspoonful of the dried apples.

**Drying of plants used in medicine.**—For collecting and preparing medicinal plants for sale, reference is made to Farmers' Bulletin No. 663, Drug Plants Under Cultivation, and Department of Agriculture Bulletin No. 26, American Medicinal Flowers, Fruits, and Seeds.

#### STORING DRIED VEGETABLES.

When vegetables are first taken from the drier, if completely dried, they are very brittle. They are more easily handled and are in better condition for storing if allowed to stand 1 to 3 hours to absorb enough moisture to make them slightly pliable before putting into bags or storing otherwise. If it is not convenient to store products immediately and they are allowed to stand several days, they should be heated to  $165^{\circ}$  F. to destroy any insect eggs that might be on them. Care should be taken not to overheat the vegetables.

Dried vegetables should be stored in moisture-proof containers and in a dry place free from dust and dirt. A good container is a tin box, bucket, or can fitted with a tight cover. The box should be lined with parchment paper. Put layer of about  $\frac{1}{2}$  to 1 inch of the dried vegetables in the bottom, then a layer of parchment paper; another layer of vegetables, again a layer of parchment paper, and so on until the box is full.

In a damp climate the most convenient and cheapest container is a small paper bag. A small amount should be put in each bag, just enough to use for one or two meals. This will prevent the opening of any dried product that can not be consumed in a short time. The upper part of the bag is twisted to form a neck. The neck is bent over and tied tight with a string. The entire bag is then painted with a coat of melted paraffin, using a small brush or the frayed end of a piece of rope. This makes the bag practically moisture and insect proof. To further protect from insect ravages, the bags after being labeled can be packed in a tin container with a tight-fitting cover. A large number of bags can be stored in an ordinary lard can. A glass jar with a tight seal is a good container for dried products. Paraffin-coated paper containers of various sizes can be found on the market. If such containers are used they should be stored in the same way as the paper bags.

All dried products should be examined occasionally. Upon the first appearance of insects, spread in thin layers in the sun until insects disappear, then heat in the drier or oven at a temperature of 165° F. and re-store carefully.

#### DRYING FRUITS.

Only fresh ripe fruits should be used for drying. In very dry climates fruits are usually dried in the sun. Most fruits dried in the sun become discolored. For drying fruits in small quantities, for home use only, the small drier previously described is satisfactory. On very hot dry days fruits may be dried in the sun until the surface begins to wrinkle and then finished in the drier.

Blanching of fruits before drying is not necessary, but for some fruits a preliminary treatment before drying is advisable.

The cut fruit when exposed to the air for some time becomes discolored. This is a natural result and does not affect the food value or the flavor of the dried product. In commercial drying of fruits this darkening is often prevented by subjecting the fruits to the action of sulphur fumes. Such sulphuring is, however, not necessary. Often the sulphuring affects the taste of the fruit in an unpleasant way and by forming sulphurous acid may become harmful to the consumer. By following the methods of treatment advised in this circular the darkening will largely be prevented.

As certain fruit acids act upon the galvanized wire bottoms of the trays, it may be well to cover these with a piece of cheesecloth.

In home drying of fruits it is often advisable to begin the drying at a higher temperature and reduce the heat during the process of drying. This can not, however, be done in drying berries, as the high temperature in the beginning would cause the swelling of the fruit so the thin skin would burst and the fruit juice be lost.

The ideal moisture content of dried apples is about 23 per cent, while for peaches, plums, and cherries the moisture should be reduced to 16 or 18 per cent in order to avoid the absorption of water by the layers of sirup which become concentrated in the stone cavities of these fruits while drying. The ability to judge accurately as to when the fruit has reached the proper condition for removal from the drier can only be gained by experience. When sufficiently dried it should be impossible to press water out of the freshly cut ends of the pieces when rubbed between the fingers. No natural grain of the fruit should show when cut. It should look uniform and be leathery and pliable.

After drying is finished spread the fruit to cool quickly, as fruit when cooled slowly will shrivel and look unattractive.

It is worth noting that during the ordinary period of cooking dried fruits do not absorb as much water as was given off in the drying process, hence they are usually sweeter than fresh fruits and do not require so much sugar to prepare them for the table as fresh fruits do.

**Berries.**—Select berries, fully ripe, for drying. Wash (for the softer varieties by placing them in a colander and pouring water over them) free from leaves and stems and remove surface water. Handle carefully and do not bruise. It will be advisable to let dry in air for a day or so until the berries commence to look wilted and slightly wrinkled, then finish in drier. If started at first in drier, commence at 110° F. Raise the temperature slowly in the course of 1 or 2 hours to about 130° F. When a considerable portion of moisture has evaporated the temperature can be increased.

Currants, black and red, can be dried at a uniform heat of from 155° to 165° F. after the preliminary drying in the air or in the evaporator. When dry rub off the stems; leave in loose piles in an airy place for a day before storing.

Blueberries, huckleberries, elderberries, strawberries (solid-meated varieties only, red and black raspberries, dewberries, blackberries, etc., should be dried in the air until wilted or started at 110° F. increasing slowly to 125° to 130° F. When commencing to wrinkle, increase the heat to 140° F. and finish at that temperature.

Gooseberries must be fully ripe. They will be rather sour and are difficult to sweeten properly in preparing for the table. Wash and stem. Start drying at 110° to 120° F. and increase slowly to 135° F. When half dry remove from drier, let stand until next day, then finish at from 135° to 165° F.

Apricots should not be so ripe that the juice will flow when breaking them apart. Wash, split with a nickel-plated knife and remove pit. Dry very slowly at 120° F., gradually increasing temperature to 145° F. After about 3 to 4 hours drying, remove from drier and let

cool for 1 to 2 hours. Replace in drier and finish at from 145° to 165° F.

**Cherries** should be perfectly ripe. Wash and stem and place on trays with stem end up. Give preliminary drying in sun for 1 or 2 days, or start at 110° F. increasing slowly to 135° to 140° F. in order that the skin shall not burst and the juice be lost. As drying proceeds, the heat may be increased to 165° F. Cherries may be stoned before drying, but there will be some loss of juice.

**Plums.**—The small thin-fleshed varieties are not suitable for drying. For European and Japanese varieties wash and stem. Place in trays with stem end up. They may be dried in hot sun for 1 or 2 days before placing in drier at 140° F. If started in the drier, commence drying at 110° to 120° F. increasing slowly to 145° F. until most of the moisture is evaporated. Then increase the heat gradually to 165° to 170° F. and finish at that temperature.

For American varieties of plums, when medium ripe, place in crocks, cover with boiling water, cover and let stand for 20 minutes. Drain, remove surface moisture, and dry, gradually increasing temperature from 110° to 150° F.

**Peaches.**—Peaches are usually dried unpeeled. They may be peeled if desired. Wash, cut in halves, pit, place in trays with pit side up, and start drying at 110° to 120° F. increasing slowly to 140° to 150° F., and finished at this temperature. For thick-fleshed varieties heat may be increased to 165° F. Peaches may be boiled in a thin sirup a few minutes before drying.

**Apples.**—Firm, slightly acid fall and winter apples are best for drying. Soft summer fruit is not as good. Wash, pare, core, and cut in slices  $\frac{1}{8}$  to  $\frac{1}{4}$  inch in thickness. Drop at once in cold salt water to prevent discoloring. Use  $\frac{1}{2}$  teaspoon of salt to 1 quart of water if fruit is to be left in the bath for some time—or a stronger solution (1 ounce of salt to 1 gallon water) is used if the fruit is dipped only for 1 or 2 minutes. Drain well, spread on drying trays in single layers, edges slightly overlapping. Begin drying at 110° to 120° F., increasing gradually up to 175° to 180° F., or start drying at about 200° F. and reduce temperature to 175° F. Dry until no juice can be pressed out of cut surface when rubbed between fingers. The rings should not be dried hard, but be spongy when broken.

Parings and cores of the apples are cut in pieces and dried at a higher temperature if desired for apple tea. Start at about 250° and reduce to 185° F. Parings and cores may also be utilized for jellies or fruit pastes (see Farmers' Bulletin No. 853) or for vinegar making.

**Pears.**—Varieties that become spongy and tough in boiling are not good for drying. Small, tender, and juicy pears can be dried without blanching or boiling. Wash, pare, slice, dip in cold salt water as for

apples, and dry at the same temperature as given for apples. Other varieties of pears can be pared, sliced, and dropped in cold water and vinegar (1 tablespoon vinegar to 1 quart water). Drain and dry at temperature given. Where pears are rather solid-meated it is often advisable to steam until nearly done before drying.

Certain varieties of pears with a rather flat taste may be improved by boiling in water with a little vinegar and sugar added (1 tablespoon vinegar and 2 tablespoons of sugar for 1 quart of water) until nearly tender before drying.

A specially fancy product can be made by selecting medium-sized, juicy, and tender pears. Pare and boil whole in a thin sirup until they can be pierced with a straw. Lift carefully into a sieve and drain. Place in drier and start at 120° F., increasing slowly up to 145° to 150° F. When the surface has become so dry that the pears can be pressed without bursting, remove from drier, place in a pear press (2 pieces of nonresinous board fastened together with hinges), and flatten. Return to drier and finish at a temperature of from 150° to 180° F. This product, when carefully dried, will be of a light yellow color and will be found especially good for stewed fruit.

**Figs.**—The large, meaty varieties are best for drying. Pick fruit when fully ripe (so ripe that the stem commences to bend), rinse in clean water and dip for 2 minutes in boiling brine made by dissolving 3 ounces of salt in 1 gallon of water. Drain well and spread in single layers on drying trays. Start drying at about 120° F. and increase slowly to about 140° F. The drying can also be started in the hot sun and partly dried there, provided the figs are screened so insects will not attack them. When about half dry remove from drier, split open on one side, flatten or press lightly, return to drier, and finish at a temperature of from 140° to 145° F. When finished the figs should be soft and pliable, but so dry that no juice can be pressed out when the cut surface is rubbed between the fingers.

Figs may also be prepared for drying by the following method: Dissolve 1 ounce lime in 1 gallon of water. Into this limewater drop 2 quarts of ripe figs and leave for 1 hour. Drain and put in clean, cold water for  $\frac{1}{2}$  hour. Make a sirup by boiling for 10 minutes 1 quart of sugar in 1 quart of water. Drain the figs and drop into the boiling sirup. Let boil rapidly until clear. Drain, place on trays, stem end up, and dry either partly in the sun or entirely in the drier at 130° to 150° F.

If figs are not so ripe that they drop from the trees, they may be blanched in boiling lye for 1 minute (2 tablespoons of lye to 2 quarts of water), immediately removed to cold water, and rinsed in 2 changes of clear water. Then drop into lime water and proceed as above directed.

**Guavas.**—Select fruit, just ripe, for drying. Wash, pare, cut in half and with a spoon remove seed and pulp, which can be utilized for jelly making. Blanch for 15 to 30 seconds in boiling water or for 1 minute in live steam. Spread on cheesecloth in drier and commence drying at 120° F., increasing slowly to 155° F.

#### STORAGE OF DRIED FRUITS.

Dried fruits should be stored in the same way as dried vegetables. (See p. 18.)

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